Claim Amendment:

This listing of claims replaces all prior versions and listings of claims in this application.

Claims:

1. (Previously presented) An antenna structure comprising:

(a) a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the conductive plane having an opening therein; and

(b) an antenna driving element disposed adjacent the opening in the conductive plane on a side of the conductive plane which is remote from said array of conductive elements, which driving element, in operation, excites the antenna structure by pumping RF energy through the opening in the conductive plane.

2. (Original) The antenna structure of claim 1 wherein the conductive plane and the array of conductive elements are disposed on opposite side of a insulating substrate.

3. (Original) The antenna structure of claim 2 wherein each of the elements in the array is coupled to the conductive plane by a conductive via arranged through the insulating substrate.

4. (Original) The antenna structure of claim 3 wherein each conductive element in the array of conductive elements is of a polygonal configuration and wherein the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

5. (Original) The antenna structure of claim 4 wherein the polygonal configuration of each conductive element is a rectangle.

6. (Original) The antenna structure of claim 5 wherein the polygonal configuration

of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

7. (Previously presented) An antenna structure comprising:

(a) a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the array of conductive elements being arranged with a common pitch in said array, the conductive plane having an opening therein; and

(b) an antenna driving element disposed adjacent the opening in the conductive plane, which driving element, in operation, excites the antenna structure by pumping RF energy through the opening in the conductive plane;

wherein the opening in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength to one wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

8. (Original) The antenna structure of claim 7 wherein the width of the opening in the conductive plane is approximately equal to a spacing between adjacent ones of the conductive elements in said array.

9. (Original) The antenna structure of claim 7 wherein the antenna driving element is a waveguide.

10. (Original) The antenna structure of claim 9 wherein the waveguide has walls adjacent its aperture, which walls have a rectangular configuration adapted to mate with the opening in the conductive plane.

11. (Original) The antenna structure of claim 7 wherein the antenna driving element is a microstrip radiator disposed opposite the opening in the conductive plane, spaced from the opening in the conductive plane by a distance which is less than 10% of a wavelength of the operating frequency of the antenna structure.

12. (Previously presented) The antenna structure of claim 1 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure.

13. (Previously presented) A method of making an antenna comprising:

(a) providing a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the conductive plane having an opening therein; and

(b) disposing an antenna driving element adjacent the opening in the conductive plane on a side of said conductive plane which is remote from said array of conductive elements.

14. (Original) The method of claim 13 wherein the conductive plane and the array of conductive elements are disposed on opposite sides of an insulating substrate.

15. (Original) The method of claim 14 wherein the insulating substrate is of a type compatible with printed circuit manufacturing technology and wherein the array of conductive elements are formed thereon using printed circuit board manufacturing technology.

16. (Original) The method of claim 14 further including coupling each of the elements in the array to the conductive plane by a conductive via arranged through the insulating substrate.

17. (Original) The method of claim 16 wherein each conductive element in the array of conductive elements has a polygonal configuration and further including the step of arranging the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

18. (Original) The method of claim 17 wherein the polygonal configuration of each conductive element is a rectangle.

19. (Original) The method of claim 18 wherein the polygonal configuration of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

20. (Previously presented) A method of making an antenna comprising:

(a) providing a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the array of conductive elements being arranged with a common pitch in said array, the conductive plane having an opening therein; and

(b) disposing an antenna driving element adjacent the opening in the conductive plane;

wherein the opening formed in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

21. (Original) The method of claim 20 wherein the width of the opening in the conductive plane is approximately equal to a spacing between adjacent ones of the conductive elements in said array.

22. (Original) The method of claim 20 wherein the antenna driving element is a waveguide.

23. (Original) The method of claim 22 wherein the waveguide has walls adjacent its aperture, which walls have a rectangular configuration adapted to mate with the opening in the conductive plane.

24. (Original) The method of claim 20 wherein the antenna driving element is a

microstrip radiator disposed opposite and spaced from the opening in the conductive plane by a distance which is less than 10% of a wavelength of the operating frequency of the antenna structure.

25. (Original) The method of claim 13 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure.

26. (Previously presented) An antenna structure comprising:

(a) a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the conductive plane having a waveguide opening therein; and

(b) a waveguide disposed adjacent the opening in the conductive plane, which waveguide, in operation, excites the antenna structure by pumping RF energy through the waveguide opening in the conductive plane.

27. (Previously presented) The antenna structure of claim 26 wherein the conductive plane and the array of conductive elements are disposed on opposite side of a insulating substrate.

28. (Previously presented) The antenna structure of claim 27 wherein each of the elements in the array is coupled to the conductive plane by a conductive via arranged through the insulating substrate.

29. (Previously presented) The antenna structure of claim 28 wherein each conductive element in the array of conductive elements is of a polygonal configuration and wherein the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

30. (Previously presented) The antenna structure of claim 29 wherein the polygonal configuration of each conductive element is a rectangle.

31. (Previously presented) The antenna structure of claim 30 wherein the polygonal configuration of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

32. (Previously presented) The antenna structure of claim 31 wherein the waveguide opening in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength to one wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

33. (Previously presented) The antenna structure of claim 32 wherein the width of the waveguide opening in the conductive plane is approximately equal to a spacing between adjacent ones of the conductive elements in said array.

34. (Previously presented) The antenna structure of claim 26 wherein the waveguide driving element has walls adjacent an aperture thereof, which walls have a rectangular configuration adapted to mate with the waveguide opening in the conductive plane.

35. (Previously presented) The antenna structure of claim 26 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure.

36. (Currently amended) A method of making an antenna comprising:

(a) providing a high impedance surface, the high impedance surface having a conductive plane and an array of conductive elements spaced from the conductive plane by a distance which is no greater than 25% of a wavelength of an operating frequency of the antenna structure, the conductive plane having a waveguide opening therein; and

(b) disposing a waveguide <u>adjacent</u> the waveguide opening in the conductive plane.

37. (Previously presented) The method of claim 36 wherein the conductive plane and the array of conductive elements are disposed on opposite sides of an insulating substrate.

38. (Previously presented) The method of claim 37 wherein the insulating substrate is of a type compatible with printed circuit manufacturing technology and wherein the array of conductive elements are formed thereon using printed circuit board manufacturing technology.

39. (Previously presented) The method of claim 37 further including coupling each of the elements in the array to the conductive plane by a conductive via arranged through the insulating substrate.

40. (Previously presented) The method of claim 39 wherein each conductive element in the array of conductive elements has a polygonal configuration and further including the step of arranging the conductive elements in the array are arranged in a regular repeating pattern of polygonal configurations.

41. (Previously presented) The method of claim 40 wherein the polygonal configuration of each conductive element is a rectangle.

42. (Previously presented) The method of claim 41 wherein the polygonal configuration of each conductive element is a square and wherein the square conductive elements are arranged with a common pitch in said array.

43. (Previously presented) The method of claim 42 wherein the waveguide opening formed in the conductive plane is rectangular, having a breadth which is about 0.5 of a wavelength of the operating frequency of the antenna structure and a width which is no greater than the common pitch of the conductive elements in the array.

44. (Previously presented) The method of claim 43 wherein the width of the waveguide opening in the conductive plane is approximately equal to a spacing

between adjacent ones of the conductive elements in said array.

45. (Previously presented) The method of claim 36 wherein the waveguide has walls adjacent its aperture, which walls have a rectangular configuration adapted to mate with the opening in the conductive plane..

46. (Previously presented) The method of claim 36 wherein the array of conductive elements is spaced from the conductive plane by a distance which is no greater than 10% of a wavelength of an operating frequency of the antenna structure.